We claim:

1. A method of operably interconnecting an electrooptic (EO) polymer waveguide and a passive polymer waveguide, comprising:

providing a tapered electrooptic (EO) polymer waveguide interconnection structure between an EO polymer waveguide and a passive polymer waveguide.

2. A method of fabricating a waveguide structure, comprising:

coating a passive polymer lower cladding over a substrate;

coating a passive core layer lower portion over the passive polymer lower cladding;

curing the passive polymer lower cladding and the passive core layer lower portion;

coating an electrooptic (EO) polymer layer over the passive core layer lower portion;

etching the EO polymer layer to produce a tapered EO polymer layer with a tapered region;

coating an passive core layer upper portion over the tapered EO polymer layer;

etching the tapered EO polymer layer to produce a rib waveguide structure; and

coating a passive polymer upper cladding over the rib waveguide structure.

3. The method of fabricating a waveguide structure of claim 2, wherein the passive polymer lower cladding and the passive core layer lower portion are cured with ultraviolet (UV) light.

4. The method of fabricating a waveguide structure of claim 2, wherein the passive polymer lower cladding and the passive core layer lower portion are cured in a nitrogen environment.

5. The method of fabricating a waveguide structure of claim 2, wherein the EO polymer layer is etched by oxygen plasma with a shadow mask to produce the tapered region.

6. The method of fabricating a waveguide structure of claim 5, wherein a fixed radio frequency (RF) power and gas pressure are employed for etching the EO polymer layer.

7. The method of fabricating a waveguide structure of claim 5, wherein a width of a gap between the EO polymer layer and the shadow mask is selected to control a taper length of the tapered region.

8. The method of fabricating a waveguide structure of claim 2, wherein the tapered EO polymer layer is etched by:

printing waveguide patterns over the tapered EO polymer layer; and

employing an oxygen reactive ion etching process to produce the rib waveguide structure.

9. A waveguide structure, comprising:

an electrooptic (EO) polymer waveguide;

a passive polymer waveguide; and

a tapered EO polymer waveguide interconnection structure between the EO polymer waveguide and the passive polymer waveguide.

10. The waveguide structure of claim 9, wherein the EO polymer waveguide and the passive polymer waveguide provide single mode propagation, and the interconnection structure provides a coupling between the two waveguides without higher order mode coupling.

11. The waveguide structure of claim 9, wherein an interconnection loss associated with the interconnection structure is less than 0.4 dB.

12. The waveguide structure of claim 9, wherein the interconnection structure is vertically tapered.

13. The waveguide structure of claim 9, wherein a taper length of the interconnection structure is 300 μm or more.

14. The waveguide structure of claim 9, wherein a taper angle of the interconnection structure is no greater than 0.4 degrees.

15. The waveguide structure of claim 9, wherein the EO polymer waveguide and the passive polymer waveguide are formed as rib structures.

16. The waveguide structure of claim 9, wherein the EO polymer waveguide has a higher refractive index that the passive polymer waveguide.

17. The waveguide structure of claim 9, wherein the passive polymer waveguide has a larger mode profile than the EO polymer waveguide.

18. The waveguide structure of claim 9, wherein the EO polymer waveguide comprises a nonlinear chromophore.

19. The waveguide structure of claim 18, wherein the nonlinear chromophore includes a tricyanobutadiene acceptor and a phenyltetraene bridge.

20. The waveguide structure of claim 9, wherein the passive polymer waveguide comprises a fluorinated polymer.

21. The waveguide structure of claim 9, wherein the passive polymer waveguide comprises a fluorinated acrylate.